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The Patentee produces a new material for spinning, from shreds of cloth, by cutting them first into stripes, and cutting them again into short pieces, and reducing them to a loose staple fit for spinning, by one or more of the mechanical operations before described.

Patent of Mr. James Barron of Wells-street, London, brass founder, for improvements in the apparatus used for rollers, for window-blinds, maps and other similar objects.

Dated Dec. 1809.

The novelty in these rollers consists in the mode of suspension, which is effected by two pieces of metal bent at right angles, one side of which is fastened to the suspending lath above, and the other side descends perpendicularly to sustain the roller. One of these bent pieces is a spring that draws the roller upwards when at rest, so as to bring its pulley into contact with the suspending lath and prevent its turning farther, by which means the blind remains stationary, at whatever position it is drawn down; the operation of drawing down the cord, causes the spring to descend sufficiently to disengage the pulley, and permit it to turn round freely; a wedge is placed beneath the spring in such a manner that by turning a screw it can be forced forward so as to make the spring stiffer when required. The other bent iron is attached to the lath by staples, along which it slides in the manner of a bolt, and is retained in its place by a spring catch; on disengaging which, it may be drawn out, and the roller be taken down from its place. Mr. Barron prefers conical sockets at the end of the bent pieces for the pivots of the rollers to turn in, as producing less friction.

Patent of Mr. George Pocock of Bristol, schoolmaster, for his invention of geographical slates for the construction of maps.

Dated June, 1808.

Mr. Pocock's invention consists in drawing and conducting lines of latitude and longitude, or other material geographical lines or projections, ac-

cording to the sort of maps required, on the slates commonly used in schools; which lines shall serve as guides to learners in geography to sketch the relative situations of the different parts and kingdoms of the world. To the specification a drawing is annexed of the lines proper for the Eastern and Western hemispheres, for one of those slates (which are the same as those in the common maps.) Slates for forming maps of the several quarters of the world, or any parts of it, are prepared with appropriate lines, according to the maps required. The method which Mr. Pocock prefers for drawing those lines; is, to mark first the longitudinal lines of the globe, on a thin piece of metal, and then to cut out the space between every second pair of them, leaving alternately solid and open spaces, till the hemisphere is finished; this plate will then serve as a ruler, by which the longitudinal lines may be drawn and indented on the slate, by a sharp pointed tool, or other proper instrument: the latitudinal lines may be made in the same way, by another plate cut out in a similar manner.

Account of Nautical inventions of Mr. R. Trevithick.

Phil. Mag. V. 54, p. 426.

Continued from p. 54.

Mr. Trevithick proposes two methods of moving ships by steam. The first consists of a revolving wheel furnished with leaves to lay hold of the water; which is placed in an air tight receptacle only open at bottom, in which the height that the water is permitted to rise (or the dip of the wheel) is perfectly under the command of an air pump, which as well as the wheel is worked by a steam engine.

In the second method, a wheel, or a sufficient portion of a wheel, to which an arm of considerable length is attached, receives an alternating motion from a rack on the piston rod of the steam engine. The arm just mentioned is employed to give motion to a valve, or valves, included in an hollow trunk or prism (attached to, or actually contained in the ship) placed longitudinally,

and made of a size suitable to the effect that is desired. Mr. Trevithick imagines that by confining the water by this trough from escaping laterally, the effect of the impulse of the valves will be greater than that of oars moving in the open sea, in which part of the force is lost in producing a lateral motion in the water, which escapes sideways: the Editor of the *Philosophical Magazine* expresses his preference of this Method to the first described.

If the hollow trunk, be made moveable and attached to the rowing arm, and there be a stop within of the nature of a valve, to shut against the stroke, and open with the return, the effect will be the same (in Mr. T's opinion) as that of the former arrangement, but the machinery would be more cumbersome, and apt to get out of repair.

Mr. Trevithick's next invention consists of

III Sliding tubular masts made of iron, so constructed that the upper masts may slide into the lower, like the tubes of a telescope.

An hollow iron mast of the thickness of half an inch, and of the same height and diameter as a wooden one will be much stronger and lighter, considerably more durable, less liable to be injured by shot, and can be easily repaired even at sea. One which will weigh 12 tons, and cost £540, at £45 per ton, will be one half stronger than a wooden mast of the same dimensions, which will weigh 28 tons, and cost near £1,200.

The iron mast is to be made to strike nearly as low as the deck, to ease the ship in a heavy sea. Wooden masts must in such circumstances be cut away. Ships furnished with these masts will not like others, be exposed to the risk of receiving damage from lightning. The iron mast being itself an excellent conductor, from which the communication to the water may be completed, by driving an iron bolt from beneath its bottom through the keelson and keel; and by this means the electric matter will be conducted through the bottom of the ship into the water, without doing any injury to the ship.

Yards and bowsprits may also be

made of wrought iron, with the same proportion of strength and expense as the mast. Chain shrouds and stays made of iron, may also be used with these masts, and will not cost half the expense of rope, while they will prove ten times more durable. For many other purposes in shipping, wrought iron employed as a substitute for the materials now in use, would have as great advantages as in the articles above mentioned, even the whole hull may be made of wrought iron.

Remarks... Mr. Trevithick, is an ingenious self-taught artist, who has derived his knowledge from his own practice, and has not perhaps had leisure to study the sciences which relate to his profession of engineer, as accurately as perhaps he could wish himself. Some allowance may therefore be made to him for errors on the abstruse subject of impelling ships by power; which involves considerations of the law of motion, and of hydrostatics, and hydraulics, which are seldom the object of discussion, and are therefore to be known only by a minute study of those matters, which few attain: but certainly the Editor of the *Philosophical Magazine*, cannot claim the same indulgence;—and should therefore have been silent on points to which his knowledge did not extend; especially as the observations of the world on his plan (published in 1806) for extinguishing fires in ships, by fixed air from chalk and sulphuric acid, stowed aboard for this purpose, might have taught him the danger of getting out of his depth in venturing on the sea.

The first plan proposed by Mr. Trevithick for impelling ships, by a revolving wheel, is instead of being the worst of those proposed, as asserted in the *Philosophical Magazine*, the sole one which would have any efficacy, for neither of the others would give a ship any motion. To impel a body through, or on any single substance, an impulse must be made on that substance, by something proceeding from the body, the re-action on which gives the motion desired; it is evident therefore that it is only the manner in which this agent operates on

the external substance that can produce any re-acting effect, and that all its motions within the body are of no efficacy but as they modify its ultimate impulse on the external substance.—The long trough therefore attached to a ship, with valves moved through it, will have no effect in impelling the vessel, but from the impulse with which the water rushing from its extremity, acts on the surrounding sea; and as fluids moved through tubes experience resistance to motion, in a ratio increased in proportion to the velocity with which they are driven through them, the tubular apparatus therefore instead of enabling the last impulse at its extremity to be made with more velocity (and of course in this case with more efficacy) would diminish the effect of the first mover.

The other method of putting the whole trough in motion, would cause a greater loss of power in proportion to the weight of the trough. The loss of power in the method just described would be nearly equal to the weight of the water contained in the trough (which would needlessly in this way be put into motion). The loss in the last method would be the same, with the addition of that of the weight of the trough.

The subjects of the third section, are more within the reach of common observation, but of them only the proposal of the use of iron masts, has any novelty. In a note relative to the use of chain rigging, the Editor of the *Philosophical Magazine* states that the first proposal that he had ever heard of, for using metal rigging was from (himself) Mr. Tilloch, in 1801. *Philosophical Magazine*, vol. 21, p. 108; and that the idea of employing iron rigging has actually been carried into effect by lieutenant Brown; and that a vessel rigged in this manner, but with wooden masts, was in the West India dock in London, in January last. We know of no proposal for the plan earlier than that of Mr. Tilloch, but lieutenant Brown was not the first who took active steps for its introduction. In January, 1804, Mr John Slater, took a patent for forming the rigging and cables of ships of metal chains, the specification of which was published in the 8th vol,

of the *Repertory of Arts*. Another patent we have heard was taken out about two years ago for the same object, but do not recollect the name of the Patentee. There can however be no doubt of the advantage of the use of iron rigging in point of economy; and the strength and durability of chains have been so often tried, particularly in ploughing and drawing waggons, that it is surprising there should be so much difficulty in introducing them, for standing rigging at least, in ships. Chains have been long since used for cables, and have been found extremely serviceable, particularly in the West Indies; indeed there are few ships in which a chain cable would not be found most advantageous in saving the hemp cables on various occasions.

We cannot say so much in favour of the plan of hollow iron masts; cast iron would be unfit, both on account of its brittleness, if struck by a shot, and because it cannot be cast into pieces sufficiently long, to give longitudinal strength in an advantageous manner for masts. No method has yet been devised of rolling wrought iron into pieces of more than four or five feet long, or it would be employed in making steam engine boilers, in which the number of short pieces used is evidently injurious; and hammering and welding would be too expensive an operation for making masts. These objections relate to the fabrication, not to the plan, and in this point we think the greatest difficulties would occur: of the plan we have only to object to the short lengths in which the sliding masts are proposed to be formed, which would make them very weak in proportion to the weight of metal used. Hollow masts though preferable for Merchant ships, are not so fit for vessels of war, the efficacy of a hollow mast depends on its cylindrical form, which gives the greatest strength for the least weight; but when it receives a wound from a shot, it ceases to be a perfect cylinder, and is then only a portion of a cylinder, greater or less, as the wound is smaller or larger; and all that has been proved of the advantages of a hollow cylindrical form, relate to the

perfect cylinder alone, not to its parts. It is evident the strength would decrease in a rapid ratio, as the segment of the cylinder was less; what that ratio would be, would take too much time to investigate now, but it is evident at once, that half a hollow cylinder, would have much less than half the strength of a whole one; and that a quarter would be still less strong, in proportion; and that the lesser segments would become still weaker and weaker, as the arch of which they consisted was flatter, or approached nearer to a plane plate. In the masts of men of war a very obvious saving may be made in reducing the length of the part which runs down into the hold; there can be no benefit in having them to descend below the orlop deck, at farthest; and strong uprights beneath them from thence to the keelson, would be fully adequate to support the weight above, which is the only purpose for which the part of the mast that goes below the orlop deck serves, and this it effects at an enormous expense.

As to making the whole hull of iron, which is the last plan proposed, it is no new idea, but it certainly deserves more attention than it has hitherto met. Many barges made of cast iron, and of wrought iron plates, we are informed by good authority, are now plying on the canals and rivers in different parts of England, where they are found to answer very well; but to form a ship of iron would require a combination of parts, and an internal framing very different from that of barges, and much thought and calculation would be necessary to devise these, of any adequate perfection. The chief difficulty in the execution would be in rolling plates of sufficient length to serve as planks, but plans for this purpose might no doubt be devised by the same ingenious artists, who have already overcome so many difficulties in the iron manufacture, and brought it to a state of perfection, perhaps superior to that of any other art. The chief benefit of iron ships, would be in their value as old iron, when too old for farther service, and it is probable that for those of a very large size, for

which timber of adequate scantling is so extremely expensive, iron would be found considerably cheaper in the first instance, and would besides have the advantage of leaving no waste, as every particle of it not used, would be of value.

Method of preparing from bean stalks, a substitute for Hemp; by the Rev. James Hall. Walthamstow.

Rep. of Arts, v. 16, p. 219.

Mr. Hall has ascertained that every bean plant contains from 20 to 35 filaments running up on the outside under a thin membrane, from the root to the top; those at the four corners being rather thicker and stronger than the rest. Next to Chinese grass (used for connecting hooks to fishing lines) the fibres of the bean plant are among the strongest discovered. These with a little beating, rubbing, and shaking are easily separated from the strawy part, when the plant has been steeped 8 or 10 days in water, or when it is damp, and in a state approaching to fermentation, or what is commonly called rotting. Washing, and then pulling it through hackles, or iron combs, first coarse, and then finer, is necessary to the dressing of bean hemp; and appears to Mr. Hall, the easiest way of separating the filaments from the thin membrane which surrounds them.

From carefully observing the number of bean plants in a square yard, in various situations; and from weighing the hemp or filaments of a certain number of them, Mr. Hall calculates that every acre, of bean stalks produces about 2 cwt. of hemp.

He computes that there are 200,000 acres of beans planted annually in Great Britain and Ireland, which at the present rate of hemp, from 60 to £120 per ton, must produce a large profit to the proprietors, if it were collected from the beans, exclusive of the great national advantage of having a supply of hemp at home, when foreign markets for it are cut off, and the benefit it would afford in giving employment to the poor.

Mr. Hall exposed a parcel of the hemp nearly 12 months, to all the varieties of the air within doors, and